



# Meeting The Educational Challenges Of Transformation



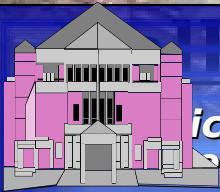
Dennis M. Murphy  
Professor of Information Operations/Information in  
Warfare

**Ridgeway Hall**



**Army Heritage &  
Education  
Center**

**Collins**



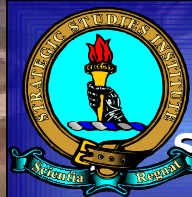
**Center for  
Strategic Leadership  
Peacekeeping and  
Stability Operations  
Institute**

**Thorpe Field**



**Army Physical  
Fitness Research  
Institute**

**Root Hall**



**Strategic  
Studies  
Institute**



# Grand Purpose

***Not to Promote War but to Preserve  
Peace...Study and Confer on the Great  
Problems of National Defense, of  
Military Science, and of Responsible  
Command"***



***"The mission of the United States Army War College is to prepare selected military, civilian, and international leaders for the responsibilities of strategic leadership; educate current and future leaders on the development and employment of landpower in a joint, interagency, intergovernmental, and multinational environment; research and publish on national security and military strategy; and engage in activities that***



# UNITED STATES ARMY WAR COLLEGE



## DISTINGUISHED GRADUATES





# Class Composition



RESIDENT CLASS OF 2005

**TOTAL=**  
**325**



**Army 204**

25 National  
Guard  
25 Reserve



**Air Force 26**

3 Air National Guard  
4 US Air Force Reserve

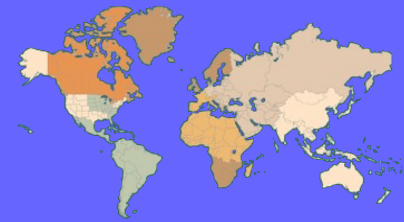


**Navy 16**

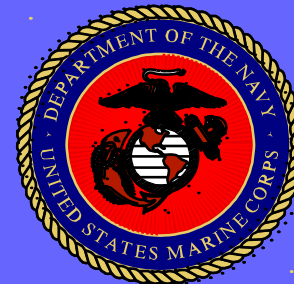
2 US Navy  
Reserve

**Civilians 24**

11 Department of the Army  
7 Defense Leadership and Management  
Program  
3 Department of State  
1 Department of Homeland Security  
1 National Geospatial Intelligence Agency



**International**  
**41**



**Marine 13**

2 USMC Reserve



**Coast Guard**  
**1**



# USAWC AY05 Resident Program

TERM I (110 Academic Days)				TERM II (44 Academic Days)		TERM III 39 Academic Days		NATIONAL SECURITY SEMINAR
COURSE 1	COURSE 2	COURSE 3	COURSE 4	WINTER RECESS	REGIONAL STRATEGIC APPRAISALS	STRATEGIC CRISIS EX.	ELECTIVES PROGRAM	
STRATEGIC LEADERSHIP	WAR, NATIONAL POLICY & STRATEGY	JOINT PROCESSES AND LANDPOWER DEVELOPMENT	IMPLEMENTING NATIONAL MILITARY STRATEGY		ELECTIVES PROGRAM	NATIONAL & THEATER STRATEGY APPLICATION		
STRATEGY RESEARCH PROGRAM								
Active Listening Professional Reading		COMMUNICATIVE		Persuasive Speaking Effective Writing				
Commandant's Lecture Series Warfighting Studies Program		ARTS PROGRAM SPECIAL PROGRAMS		Graduate Assistance Program Advanced Strategic Art Program				
Wellness Program Military History Program Military Family Program		COMPLEMENTARY PROGRAMS		Noontime Lectures Student Athletic Program				



# EDUCATION CHALLENGES IN A NETWORKED ENVIRONMENT

Global Turbulence

OIF/OEF Experiences

Life-long learning

Senior Leader acceptance/understanding

Age Gap – Younger Officers accept technology  
vs Senior Officers

Developing Technologies

Doctrine Publication

Currency of Experimentation; Exercises



# EDUCATION CHALLENGES IN SENIOR SERVICE COLLEGES

Institutional Inertia

Operationalizing technology

Operational and strategic significance?

Benefits to the combatant  
commander/national security  
community?

How to sell technology to  
operators?



Innovation makes enemies of all those who prospered under the old regime, and only lukewarm support is forthcoming from those who would prosper under the new.

Niccolo Machiavelli

(1469-1527)

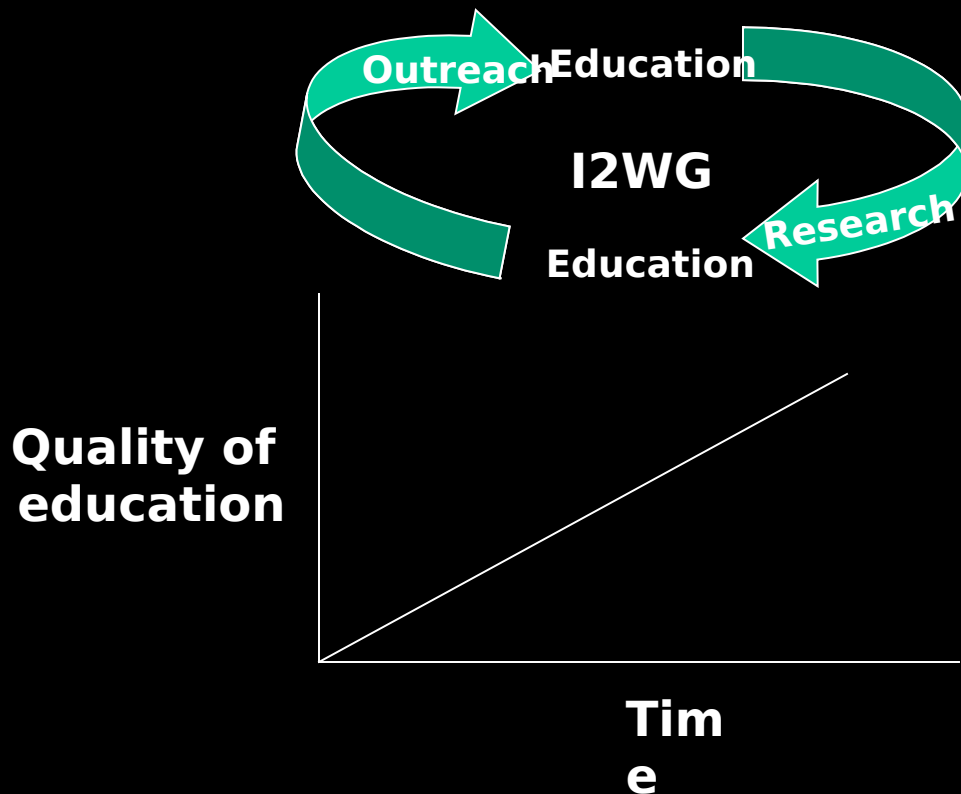


# Information in Warfare Working Group

- Charter:
  - The Information in Warfare Working Group (I2WG) coordinates and recommends the design, development and integration of information systems, network centric warfare, information operations and strategic communications content and courses into the USAWC curriculum to prepare senior leaders for warfare. It facilitates and coordinates USAWC research, publication and outreach efforts surrounding theory, practice and application with national security community information activities to inform that process.
- Membership: teaching departments, Strategic Studies Institute, Center for Strategic Leadership



# Feedback Synergy



**Outreach and research efforts inform education**  
**Educational shortfalls define focus of outreach and research efforts**  
**I2WG serves as the feedback/integrating mechanism**



“If you don't know where you're going, you'll end up somewhere else”

*-Yogi Berra*



# Information in Warfare: AY05

- 304c – Information Operations Doctrine, Organization and Planning (IO Track): 20 lessons focused on IO Joint Planning, closely integrated with WSP
- *561c - Implications of Network Centric Warfare: an in-depth look at NCW*
- 567c -Information Warfare: TS/SCI, in-depth look at national and interagency IO
- 568 - Introduction to IO: 10 lesson unclassified introduction to IO
- 597c - Modern Aids to the Military Decision Making Process: a hands on with the tools used in C4ISR and IO
- *563 – Joint Military Robotics: current and future applications of robots in warfare.*



# Implications of Network Centric Warfare



# *The National Defense Strategy of The United States of America*



**March 2005**

## 6. CONDUCTING NETWORK-CENTRIC OPERATIONS

The foundation of our operations proceeds from a simple proposition: the whole of an integrated and networked force is far more capable than the sum of its parts. Continuing advances in information and communications technologies hold promise for networking highly distributed joint and combined forces. Network-centric operational capability is achieved by linking compatible information systems with usable data. The functions of sensing, decision-making, and acting—which often in the past were built into a single platform—now can work closely even if they are geographically distributed across the battlespace.

Bringing decisive capabilities to bear increasingly will rely on our capacity to harness and protect advantages in the realm of information. Networking our forces will provide the foundation for doing so. Operations in the war on terrorism have demonstrated the advantages of timely and accurate information, while at the same time reinforcing the need for even greater joint, interoperable command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR).

Beyond battlefield applications, a network-centric force can increase efficiency and effectiveness across defense operations, intelligence functions, and business processes by giving all users access to the latest, most relevant, most accurate information. It also enables “reach-back” by more effectively employing people and capabilities without deploying them forward.

Transforming to a network-centric force requires fundamental changes in processes, policy, and culture. Change in these areas will provide the necessary speed, accuracy, and quality of decision-making critical to future success.

*We will conduct network-centric operations with compatible information and communications systems, usable data, and flexible operational constructs.*

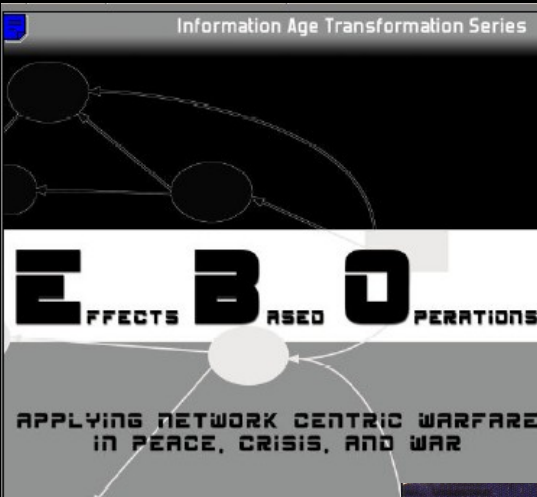


# Course Syllabus

- **NCW 01 - TODAY -Introduction to NCW/NCO**
- **NCW 02 - NCW/NCO Fundamentals (Con't)**
- **NCW 03 - Related Technologies and Concepts**

## PAPER TOPICS DUE

- **NCW 04 - Mr. John Garstka, OFT, OSD**
- **NCW 05 - OIF Current OPS -- COL (R) Jay Tisserand**
- **NCW 06 - OIF and Transformation in the Information Age COL (R) Fred Stein**
- **NCW 07 - NO CLASS 16 May:  
Attend **ROBOTIC DAY - 18 May****
- **NCW 08 - NCW - Evolving Joint Perspectives PAPERS DUE**
- **NCW 09 - Student Presentations**
- **NCW 10 - Threats and Vulnerabilities**

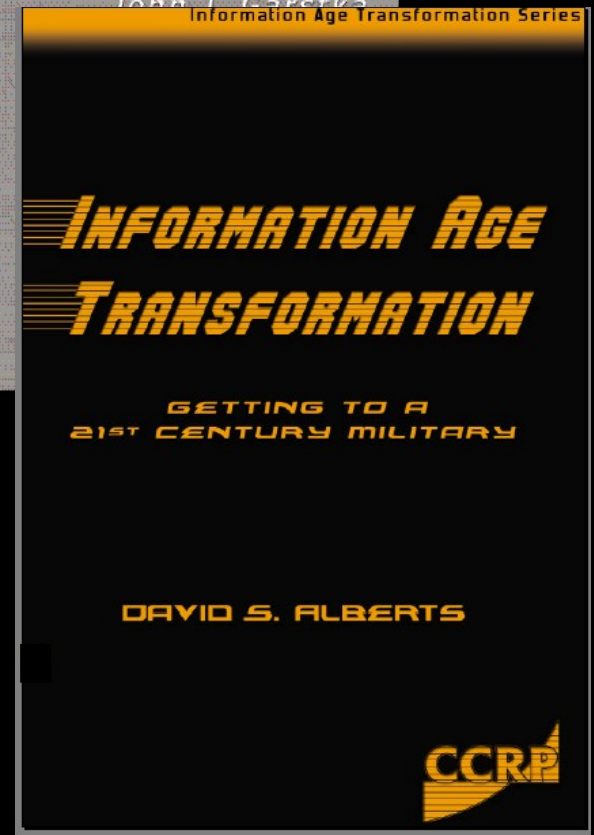
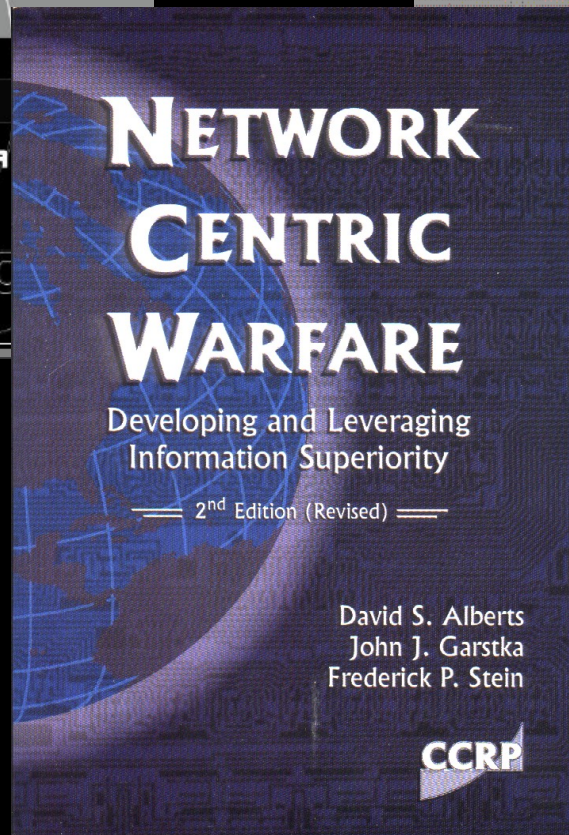
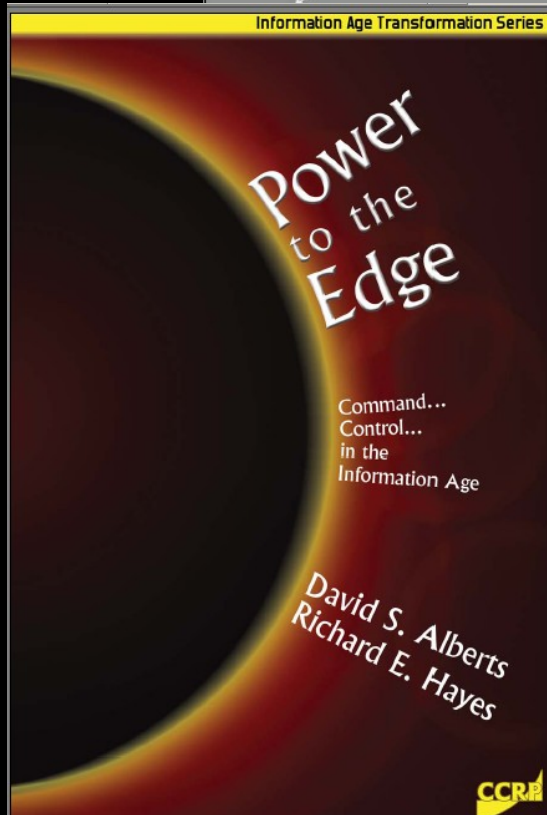


# UNDERSTANDING INFORMATION AGE WARFARE

David S. Alberts

John J. Garstka

Information Age Transformation Series





# Implications of Network Centric Warfare

## **Objectives:**

**To acquire an understanding of the evolving concept of NCW; its implications C4ISR systems.**

**To obtain an in-depth appreciation for the underpinnings NCW, its implications for allied and coalition operations as well as how NCW relates to transformation of US forces as a component of our National Military Strategy.**



# **Implications of Network Centric Warfare**

**To gain an appreciation for  
the related technology  
Objectives of nanotechnology  
and robotics.**

**To examine threats and  
vulnerabilities to  
networked systems  
using a secure network  
such as the Global  
Command and Control  
System (GCCS).**



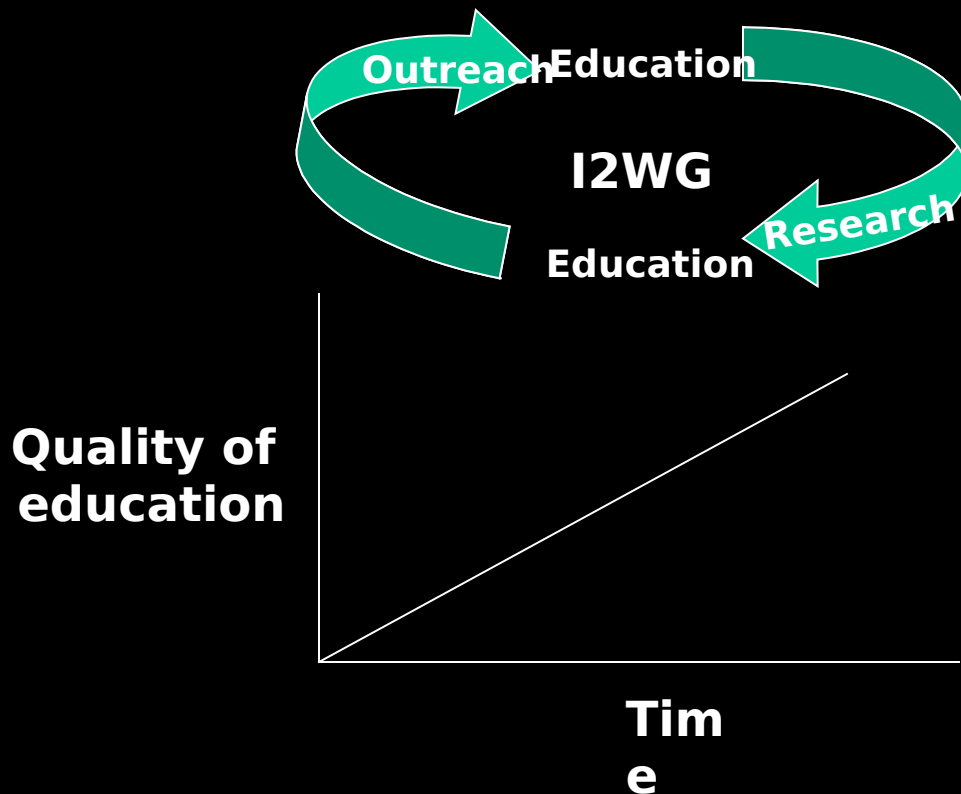
# Definition: Benefits to the Commander

## Definition of Network Centric Warfare

NCW is about *human and organizational* behavior. NCW is based on adopting a new way of thinking—network-centric thinking—and applying it to military operations. NCW *focuses on the combat power that can be generated* from the effective linking or networking of the warfighting enterprise. It is characterized by the *ability of geographically dispersed forces (consisting of entities) to create a high level of battlespace awareness* that can be exploited via self-synchronization and other network-centric operations to *achieve commanders' intent*.



# Feedback Synergy



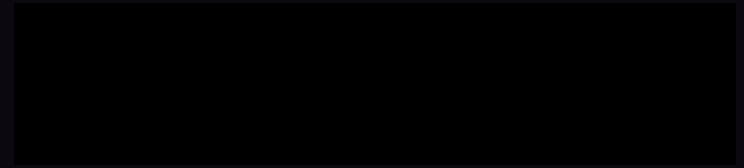
**Outreach and research efforts inform education**  
**Educational shortfalls define focus of outreach and research efforts**  
**I2WG serves as the feedback/integrating mechanism**



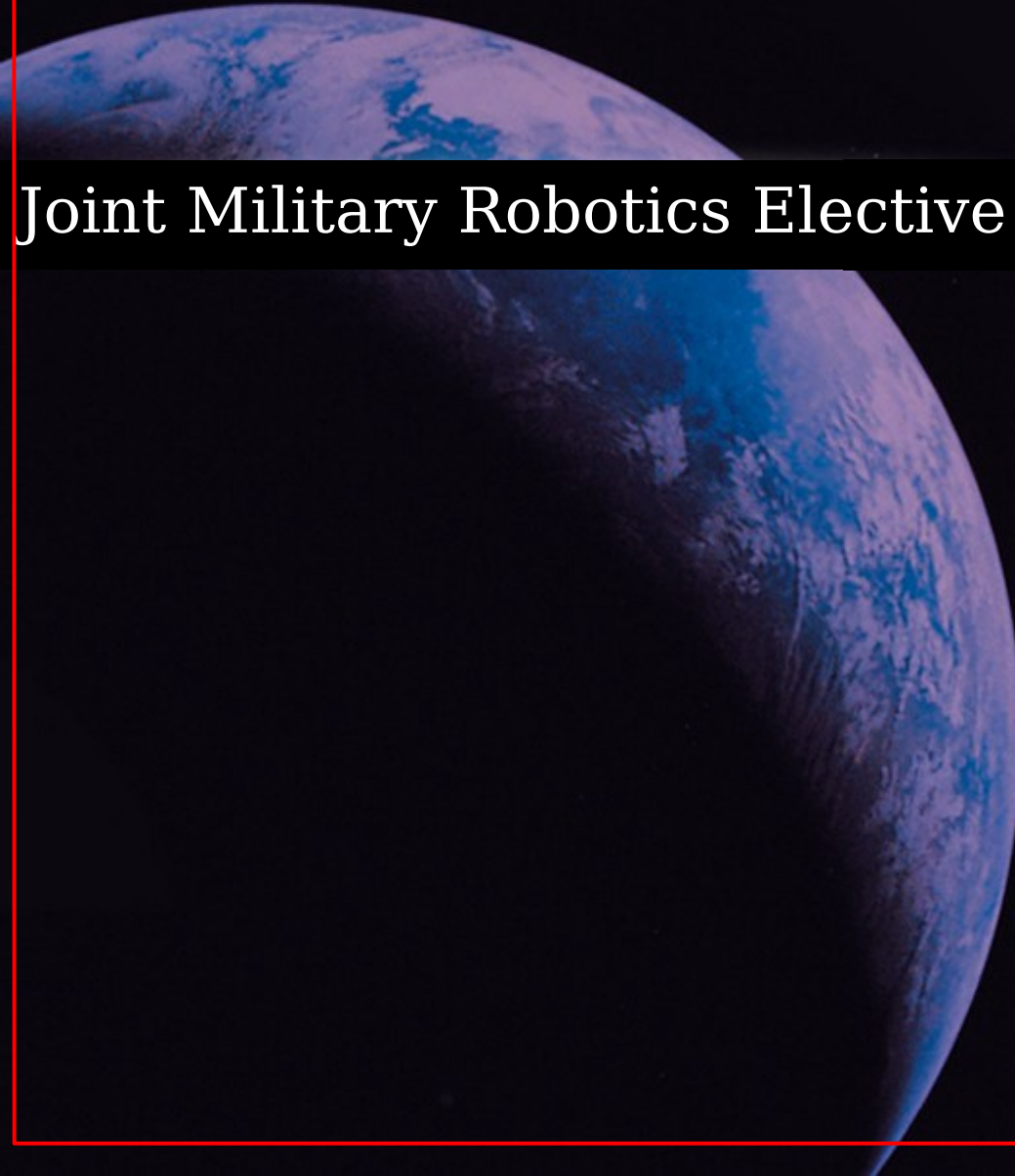
# **V Corps and 3 ID Network Centric Warfare Case Study: Initial Impressions**

[www.carlisle.army.mil](http://www.carlisle.army.mil)

***Strategic and Operational Significance***



# Joint Military Robotics Elective





# Course Objectives

**To understand the policy and doctrine associated with the use of military robot sensors or weapons systems, including an analysis of the current National Security Strategy (NSS), Department of Defense (DoD) Policy, Joint doctrine, and service component doctrine**

**To understand and analyze key components of robot technology, to include mobility, sensors, communications, size, networking capability and power systems**

**To understand key U.S. agency, joint, and service research and development organizations to include their roles/missions, capabilities and their existing robotics program, such as DARPA, Army Research Laboratory, Army Tank and Automotive Research and Development Command, Marine Corps Warfighting Laboratory, Air Force Research Laboratory and Naval Underwater Warfare Center**

**To gain an understanding and appreciation for emerging technologies and their potential impact on military operations**



# Course Syllabus

## **JMR 01 - Introduction and Robot Technology Overview**

**Dr. Tony Stentz, Carnegie Mellon University**

## **JMR 02 - Joint Robotics Program, Robotics Policy, Vision, Roadmaps, Ethics and Doctrine**

**Mr. Cliff Hudson, USD A&TL (Joint Robotics Program)**

## **JMR 03 - DARPA Robotics Efforts**

**Dr. Alex Kott, DARPA (IXO)**

## **JMR 04 - Army Robotics Efforts**

**Mr. Charles Shoemaker, Army Research Laboratory**

## **JMR 05 - Marine Corps Robotics Efforts**

**MAJ John Giscard, Marine Corps Warfighting Laboratory**



# **Course Syllabus (cont.)**

## **JMR 06 - Naval Robotics Efforts**

**Mr. Dan French, Naval Undersea Warfare Center**

## **JMR 07 - Air Force Robotics Efforts**

**Dyke Weatherington, USD A&TL (Deputy for UAV Planning)**

## **JMR 08 - Field Trip to Robotics Field Test Site and Engineering Facility**

**Ft. Indiantown Gap, PA**

**General Dynamics Robotics Systems,  
Westminster, MD**

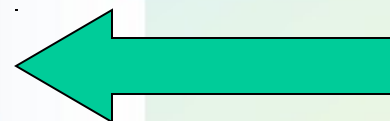
## **STRATEGIC ROBOTICS PAPERS DUE**

### **• JMR 09 - Commercial Robotics**

**» Mr. Bill Thomasmeyer, The Technology Collaborative, Pittsburgh, PA**

## **JMR 10 - Student Robotics Presentations**

# Collaborative Technology Alliance (CTA)



## Robotics



***Chuck Shoemaker***  
*ARL Collaborative Alliance Manager*

**GENERAL DYNAMICS**  
Robotic Systems

***Scott Myers***  
*Consortium Manager, General Dynamics Robotic Systems*



# **Strategic Paper Topics**

**Ethics of Mounting Weapons on Robotic Platforms  
Impacts of Robots on Policy, Strategy, and Doctrine**

**Robot Ethics - Issues and Concerns**

**Robotic Acquisition Strategy**

**Robotics in Support of Land Operations -  
Capabilities and Provisions Required Based on  
Ethical and Legal considerations**

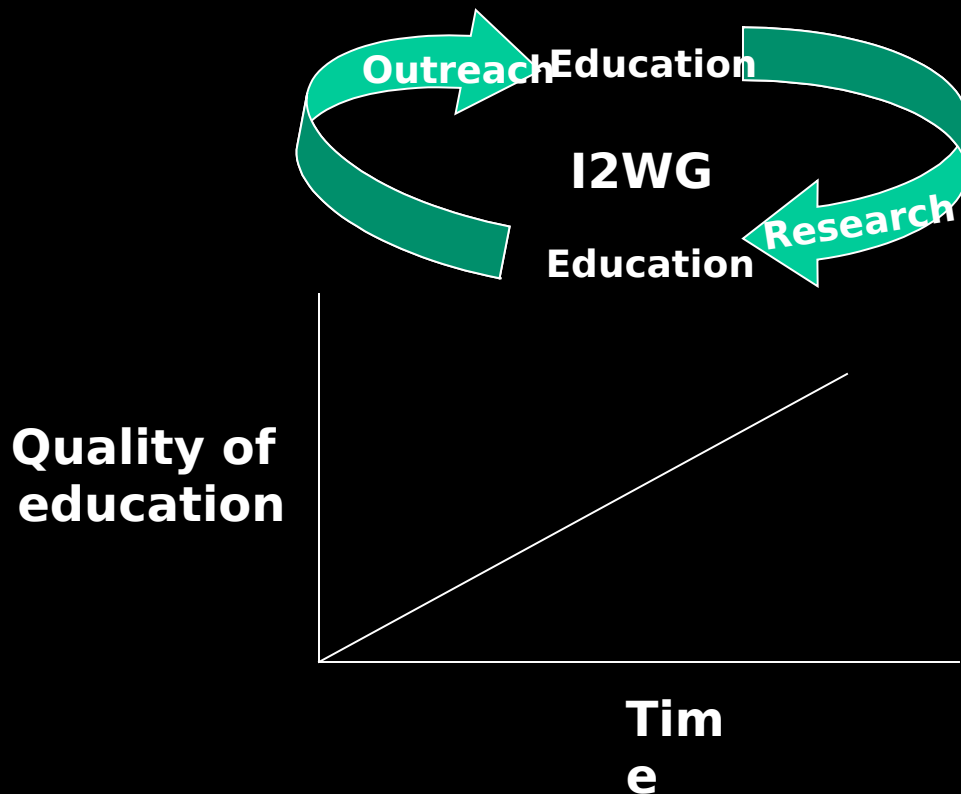
**Unmanned Combat Aerial Vehicles (UCAVs):  
Implications for Future Conflicts**

**Using Unmanned Air Vehicles (UAVs) by the  
National Guard for its Federal and Homeland  
Security Missions**

**Application of Robotics to Support Patient  
Evacuation on the Battlefield in combination with  
Life Support for Trauma and Transport (LSTATS)**



# Feedback Synergy



**Outreach and research efforts inform education**  
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# R O B O T I C S



When  
do  
you  
start  
to  
think  
strategically  
about  
Robots

***Unmanned combat aerial vehicles will bring untold capability to the warfighter of the very near future. The technology will mature and be integrated into the joint force well before the attendant strategic and doctrinal implications are fully appreciated.***

LTC Keith Edwards, USAWC Class of AY05  
Joint Military Robotics Elective Strategic Paper



# R O B O T I C S



When  
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strategically  
about  
Robots

**Robotic jockeys can now ride camels. What else could this robot carry on his camel? The robot probably never thinks about ending up in Paradise.**

# R O B O T I C S



When  
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strategically  
about  
Robots

*Ethics is a difficult concept to program into a machine because there are no formulas or numbers to be processed. Maintaining a human in the loop minimizes the ethical questions of utilizing robots in combat.*

COL Bryan Goda, USAWC Class of AY05  
Joint Military Robotics Elective Strategic Paper

# R O B O T I C S



## Future Robotic Assault Force

- HQ/TOC: 3-5 humans with Sidekick system. Airborne, heliborne, infiltrated. Can be distributed.
- 150 robots of "Wolf" class. Comparable to Talon (Foster-Miller) or Packbot (iRobot).
- 20 robots of "Grizzly" class. Comparable to XUV (GDRS).
- 30 robots of "Crow" class (airborne). Comparable to OAV (DARPA)

*All of the ground based platforms will potentially have interferences with legal provisions in operations. Robots need the capability to analyze Rules of Engagement situations and act accordingly, especially in operations of lower intensity.*

COL Gerd Brandstetter, USAWC Class of AY05  
Joint Military Robotics Elective Strategic Paper

When  
do  
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strategically  
about  
Robots



# **Autonomous Operations**

**USAWC Strategic Studies Institute may sponsor a book dealing with robots in the military forces**

**Concentrate on robotic autonomous operations**

**Book would be an anthology of related articles written by experts in the various fields of interest**

**Computer Neural Nets**

**Computer Software Architecture**

**Machine Behavior**

**Machine Perception**

**Man-machine Interfaces**

**Social implications (moral, legal, ethical, financial)**

**Book Audience**

**USAWC Students**

**Other Senior Service War College Students**

**Military and Civilian Decision Makers**

**Scientists and Technologists in the Robotics Field**



**The greatest thing you will take away from here is not the ‘Training’ of how to do things but rather the ‘Education’ of how to think about things...”**



**Gen. Shalikashvili, 27 May  
1994**

The background of the entire slide is a close-up, slightly blurred image of the American flag, showing the stars and stripes in a draped manner.

***"Not to Promote War but  
Preserve Peace..."***

***Study and Confer on the  
Great Problems of  
National Defense, of  
Military Science,***

***and of Responsible  
Command"***



QUESTIONS???